

## **MOUNTING ELECTRONIC COMPONENTS**

### **Field of the Invention**

The present invention relates to the field of electronic circuits, and, more particularly, to a method of mounting electronic components. Further, the  
5 present invention is particularly applicable to the mounting of integrated circuits (ICs) on printed circuit boards (PCBs), including flexible printed circuit boards, though the present invention may also be used to mount other components on PCBs, or to mount  
10 components on other types of carriers, for example.

### **Background of the Invention**

There are many situations where it is desirable to minimize the overall dimensions of an electronic device. One example is a miniature video  
15 camera using an image sensor formed as a single IC.

An IC is generally mounted on a PCB having a larger area. Such an arrangement is illustrated in FIG. 1 in a surface mount form. An IC 10 has a plurality of contacts 12 extending down the side face  
20 14 and under the undersurface 16 of the IC 10. The IC 10 is mounted on a PCB 18 which has a plurality of copper contact pads 20. The contact 12 is connected to the contact pad 20 by a body 22 of solder which

includes a planar portion 22A and a fillet 22B. This arrangement requires the PCB 18 to extend beyond the side of the IC 10 by a distance of at least A. In practice, a greater distance B will be required, since  
5 the copper contact pad 20 will not normally extend to the edge of the PCB 18.

Another prior art approach includes mounting an IC in a manner which reduces the horizontal dimension from that of FIG. 1. This prior art approach  
10 is illustrated in FIG. 2, in which like parts are denoted by like reference numerals. Here, the IC 10 and the PCB 18 are of the same horizontal extent. The contact 12 is positioned only on the underside 16 of the IC 10, and the copper contact pad 20 extends to the  
15 edge of the PCB 18. The connection is made by a solder body 22' which has only a planar portion. The solder fillet is lost, which degrades the mechanical strength and reliability of the connection, and may provide a poorer electrical connection.

## 20                   Summary of the Invention

An object of the present invention is to provide a method of mounting electronic components which facilitates minimization of the size of a device.

The invention in its various aspects is  
25 defined in the claims appended hereto.

## Brief Description of the Drawings

An embodiment of the invention will now be described, by way of example, referring to the drawings, in which:

FIGS. 1 and 2, previously discussed, are cross-sectional views of various prior art mounting configurations;

FIG. 3 is a cross-sectional view illustrating one embodiment of the present invention;

FIG. 4 is a cross-sectional view illustrating an alternate embodiment of the present invention; and

FIGS. 5A and 5B are perspective views showing the manufacture of a circuit board for use in the embodiments of FIGS. 3 and 4.

#### **Detailed Description of the Preferred Embodiments**

Referring to FIG. 3, an IC 10 has a plurality of contacts 12 (only one of which is shown for clarity of illustration) extending down the side face 14 and under the undersurface 16 of the IC 10. The IC 10 is mounted on a PCB 18, which may be a flexible PCB and which has a plurality of copper contact pads 20. Again, only one of the copper contact pads 20 is shown for clarity of illustration. The copper contact pad extends over the top surface 24 and down the side 26 of the PCB 18. The contact pad 20 is typically connected to other circuitry (not shown) by a copper track 28.

The PCB 18 is smaller in horizontal dimension than the IC 10, its edge being set in by a distance X. The contact 12 is connected to the contact pad 20 by a body 22 of solder which includes a planar portion 22A and a fillet 22C engaging the side of the contact pad 20. The embodiment of FIG. 3 thus provides the advantages of a filleted solder joint within a smaller package size. A modified form of the embodiment of FIG. 3 is illustrated in FIG. 4, in which the contact

12 is located only on the under surface 16 of the IC 10.

Turning now to FIG. 5, one method for forming the contact pad 20 used in the foregoing embodiments will now be described. A PCB substrate 28 is drilled at 30 and is then plated in the conventional manner to form a track 32 and a plated-through via 34. The board is then cut along the line Y - Y to produce the side contact area 36 seen in FIG. 5B. The mounting of the IC 10 to the PCB 18 can be carried out using conventional techniques, preferably those in which solder paste is deposited by printing techniques and the assembly is heated to reflow the solder.

Yet another feature of the invention includes a modification of the conventional process. It is conventional to deposit solder paste in the required pattern on the PCB, press the IC or other device(s) into the solder paste from above, and then heat the assembly to reflow the solder. This procedure may be followed with the present invention, but can suffer difficulties because the PCB is smaller than the IC. Thus, according to the present invention, the IC may be positioned upside down, solder paste deposited in the required pattern on the underside of the IC, and the PCB pressed in an upside down orientation onto the solder paste. Further, this orientation is maintained during heating, solder reflow, and cooling.

Those of skill in the art will appreciate that various modifications and improvements may be made to the foregoing embodiments within the scope of the present invention.